Mineral-plant-fibre composite coating as a cellular wood protector against fire

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What is cellular wood (CW) material?

• The CW to talk about is known with trade mark „Dendrolite”. It was produced by company “Dendrolite Latvia” SIA with an annual manufacturing capacity of 65,000 m³. [http://dendrolight.lv/en/products/core-material/](http://dendrolight.lv/en/products/core-material/).

• CW has good dimensional stability in the changing humidity.

• It is by 40% lighter than the same solid wood.

• It is readily ignitable, and burns easily once ignited with excessive heat-release rate.

• CW has very wide open surface formed by and multitude of small opened cells with thin walls.
Objective

- The objective of the presented study is to evaluate protected with mineral-plant-fiber composite (MPFC) coating CW reaction to fire.
Cone calorimeter tests (ISO 5660) for MPFC composition experimental design

• Results of heat produced by burning specimen:
  – time to piloted ignition (if take place) and time to flame out; total heat release;
  – fuel load;
  – mass loss, and its average specific rate;
  – maximal averaged heat release estimation;
  – heat release rate;
  – deeps of char layer of CW substrate

• Smoke and gasses production parameters:
  – total smoke production, and its specific release;
  – specific extinction area;
  – carbon dioxide yield.
• The optimal composition of MPFC was evaluated with large scale specimen 2.25 m² in SBI tests to the reaction to fire by:
  
  • *fire growth rate index* (FIGRA) with thresholds $\text{HRR} > 3 \text{ kW}$ and total heat release ($\text{THR} > 0.2 \text{ MJ}$ or $> 0.4 \text{ MJ}$ within $300 \text{ s} < t < 1500 \text{ s}$, and *total heat release* ($\text{THR}_{600s}$) were used for heat release classification and
  
  • *smoke growth index* (SMOGRA) and *total smoke production* (TSP) were used for smoke classification.
  
• The MPFC coating with thickness 10 mm on CW ensures fire classification *class A2/B* with no or very limited contribution to fire, as like bricks or gypsum boards, and has smoke *class s1*.

Thank you for attention!